Exelon Generation®

10 CFR 50.73

NMP2L 2655
October 4, 2017

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

Nine Mile Point Nuclear Station, Unit 2
Renewed Facility Operating License No. NPF-69
Docket No. 50-410

Subject: NMP2 Licensee Event Report 2017-001, Automatic Reactor Scram due to High Reactor Pressure

In accordance with the reporting requirements contained in 10 CFR 50.73(a)(2)(iv)(A), please find enclosed NMP2 Licensee Event Report (LER) 2017-001, Automatic Reactor Scram due to High Reactor Pressure.

There are no regulatory commitments contained in this letter.

Should you have any questions regarding the information in this submittal, please contact Dennis M. Moore, Site Regulatory Assurance Manager, at (315) 349-5219.

Respectfully,

Robert E. Kreider Jr.
Plant Manager, Nine Mile Point Nuclear Station
Exelon Generation Company, LLC

REK/KJK

Enclosure: NMP2 Licensee Event Report 2017-001, Automatic Reactor Scram due to High Reactor Pressure

cc: NRC Regional Administrator, Region I
NRC Resident Inspector
NRC Project Manager

IE22
NRR

Enclosure

NMP2 Licensee Event Report 2017-001,

Automatic Reactor Scram due to High Reactor Pressure

Nine Mile Point Nuclear Station, Unit 2

Renewed Facility Operating License No. NPF-69

NRC FORM 366 (04-2017) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB: NO. 3150-0104 EXPIRES: 03/31/2020

LICENSEE EVENT REPORT (LER)

(See Page 2 for required number of digits/characters for each block)

(See NUREG-1022, R.3 for instruction and guidance for completing this form http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1022/r3/)

1. FACILITY NAME	2. DOCKET NUMBER	3. PAGE
Nine Mile Point Unit 2	05000410	1 OF 5

4. TITLE

Automatic Reactor Scram due to High Reactor Pressure

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO.	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
									N/A	N/A
08	05	2017	2017	- 001	- 00	10	04	2017	FACILITY NAME N/A	DOCKET NUMBER N/A

9. OPERATING MODE	11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: *(Check all that apply)*			
	☐ 20.2201(b)	☐ 20.2203(a)(3)(i)	☐ 50.73(a)(2)(ii)(A)	☐ 50.73(a)(2)(viii)(A)
	☐ 20.2201(d)	☐ 20.2203(a)(3)(ii)	☐ 50.73(a)(2)(ii)(B)	☐ 50.73(a)(2)(viii)(B)
1	☐ 20.2203(a)(1)	☐ 20.2203(a)(4)	☐ 50.73(a)(2)(iii)	☐ 50.73(a)(2)(ix)(A)
	☐ 20.2203(a)(2)(i)	☐ 50.36(c)(1)(i)(A)	☒ 50.73(a)(2)(iv)(A)	☐ 50.73(a)(2)(x)
10. POWER LEVEL	☐ 20.2203(a)(2)(ii)	☐ 50.36(c)(1)(ii)(A)	☐ 50.73(a)(2)(v)(A)	☐ 73.71(a)(4)
	☐ 20.2203(a)(2)(iii)	☐ 50.36(c)(2)	☐ 50.73(a)(2)(v)(B)	☐ 73.71(a)(5)
	☐ 20.2203(a)(2)(iv)	☐ 50.46(a)(3)(ii)	☐ 50.73(a)(2)(v)(C)	☐ 73.77(a)(1)
084	☐ 20.2203(a)(2)(v)	☐ 50.73(a)(2)(i)(A)	☐ 50.73(a)(2)(v)(D)	☐ 73.77(a)(2)(i)
	☐ 20.2203(a)(2)(vi)	☐ 50.73(a)(2)(i)(B)	☐ 50.73(a)(2)(vii)	☐ 73.77(a)(2)(ii)
		☐ 50.73(a)(2)(i)(C)	☐ OTHER Specify in Abstract below or in NRC Form 366A	

12. LICENSEE CONTACT FOR THIS LER

LICENSEE CONTACT	TELEPHONE NUMBER *(Include Area Code)*
Dennis M. Moore, Site Regulatory Assurance Manager	(315) 349-5219

13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX
X	TG	CBD	GE	Y	N/A	N/A	N/A	N/A	N/A

14. SUPPLEMENTAL REPORT EXPECTED	15. EXPECTED SUBMISSION DATE	MONTH	DAY	YEAR
☐ YES *(If yes, complete 15. EXPECTED SUBMISSION DATE)* ☒ NO				

ABSTRACT *(Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)*

On August 5, 2017, at approximately 2235, the Nine Mile Point Unit 2 (NMP2) reactor scrammed on an automatic scram signal during performance of quarterly turbine stop valve surveillance testing. The automatic Reactor Protection System (RPS) actuation and reactor scram is reportable per 10 CFR 50.73(a)(2)(iv)(A). The definitive root cause of the equipment failure was not located but was bound to spurious actuation of load limit relays KL186 and KL187. The spurious action was caused by an intermittent ground and/or an induced voltage within the load limit circuit. This is a result of the non-fault tolerant original design of the Electro-hydraulic Control (EHC) system. The corrective action planned is replacement of the current single point vulnerable NMP2 Turbine EHC system with a fault tolerant Digital EHC system. Interim actions have also been developed to mitigate risk associated with testing of the current system until replacement can be accomplished during the 2018 refueling outage.

NARRATIVE

I. DESCRIPTION OF EVENT

A. PRE-EVENT PLANT CONDITIONS:

Prior to the event, Nine Mile Point Unit 2 (NMP2) was in Mode 1 and operating at 84% reactor power. Turbine controls troubleshooting and overspeed trip system repairs had been completed, followed by power ascension from 20% power to 84% power. The plant was stabilized at 84% power to support quarterly turbine valve testing.

B. EVENT:

On August 5, 2017, at approximately 2235, during performance of quarterly turbine valve testing, an automatic Reactor scram occurred. The RPS system actuation was due to high reactor pressure. The pressure increase occurred when the turbine control valves (TCV) began closing while stroking turbine stop valves (TSV) 1 and 2. All systems responded as expected to the reactor scram signal.

Based on the turbine bypass valves (TBV) fast opening and TCVs ramping closed, a loss of control valve demand was determined to be the initiator of the event. The TSV limit switch circuit was tested for grounds or stuck limit switches after the scram but none could be found. Troubleshooting identified an erroneous control valve demand signal resulting in fast closure of the control valves and subsequent increase in reactor pressure. After instrumenting the load control circuit, an anomaly on the load limit amplifier card was identified. The card was replaced and sent out for failure analysis. To further protect against latent failures, a temporary modification to lift the leads on the stop valve load limit switches was implemented. Lifting the leads minimizes the risk of fast closure of the TCVs in the event of a stuck load limit switch during future turbine valve testing.

The failure analysis of the load limit amplifier card determined the card was functioning properly and was not the cause of the event. This further supports that the spurious actuation of load limit relays KL186 and KL187 was caused by an intermittent ground and/or an induced voltage within the load limit circuit.

Nine Mile Point Unit 1 (NMP1) was unaffected by the scram at NMP2.

The event has been entered into the plant's corrective action program as IR 4039435.

C. INOPERABLE STRUCTURES, COMPONENTS, OR SYSTEMS THAT CONTRIBUTED TO THE EVENT:

No other systems, structures, or components contributed to this event.

D. DATES AND APPROXIMATE TIMES OF MAJOR OCCURRENCES AND OPERATOR ACTIONS:

The dates, times, and major occurrences and operator actions for this event are as follows. All dates are 2017.

August 5

1500 Began power ascension from 20% after completion of turbine controls troubleshooting and overspeed trip repairs.

2040 Power ascension placed on hold at 84% power and started TSV and TCV testing per N2-OSP-RPS-Q001.

2235 During step 8.8.3, when testing the last set of TSVs, the TCVs started closing, the TBVs opened and the reactor scrammed on high reactor pressure. EOP-RPV was entered due to low reactor water level, as well as high reactor pressure. N2-SOP-101C was entered due to the reactor scram.

2323 Exited EOP-RPV and N2-SOP-101C.

E. METHOD OF DISCOVERY:

This event was self-revealing during the performance of the surveillance test when relays were heard actuating unexpectedly and a reactor scram occurred.

F. SAFETY SYSTEM RESPONSES:

All systems operated as expected. After the scram, there were no safety system actuations.

II. CAUSE OF EVENT:

The definitive root cause of the equipment failure was not located but was bound to spurious actuation of load limit relays KL186 and KL187. The spurious action was caused by an intermittent ground and/or an induced voltage within the load limit circuit. This is a result of the non-fault tolerant original design of the Electro-hydraulic Control (EHC) system.

III. ANALYSIS OF THE EVENT:

The automatic reactor scram is reportable under 10 CFR 50.72(b)(2)(iv)(B) and 10 CFR 50.73(a)(2)(iv)(A). It is defined under paragraph 10 CFR 50.73(a)(2)(iv)(A) as any event or condition that resulted in manual or automatic action of any of the systems listed in 10 CFR 50.73(a)(2)(iv)(B). The RPS system actuation, including reactor scram, is listed in 10 CFR 50.73(a)(2)(iv)(B).

LICENSEE EVENT REPORT (LER) CONTINUATION SHEET

(See NUREG-1022, R.3 for instruction and guidance for completing this form http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1022/r3/)

1. FACILITY NAME	2. DOCKET NUMBER	3. LER NUMBER		
		YEAR	SEQUENTIAL NUMBER	REV NO.
Nine Mile Point Unit 2	05000410	2017	- 001	- 00

NARRATIVE

The definitive root cause of the equipment failure was not located but was bound to spurious actuation of load limit relays KL186 and KL187. The spurious action was caused by an intermittent ground and/or an induced voltage within the load limit circuit. The relay actuation resulted in the TCVs closing, the TBVs opening and a reactor scram on high reactor pressure. All control rods fully inserted and there were no safety system actuations.

Based on the above discussion, it is concluded that the safety significance of this event is low and the event did not pose a threat to the health and safety of the public or plant personnel.

Troubleshooting identified an erroneous control valve demand signal resulting in fast closure of the TCVs and subsequent increase in reactor pressure. After instrumenting the load control circuit, an anomaly on the load limit amplifier card was identified. The load limit amplifier card was replaced. Failure analysis did not identify any anomalies with the card. To further protect against latent failures, leads have been lifted on the stop valve load limit switches to prevent fast closure of the TCVs in the event of a stuck load limit switch during future valve testing.

This event does affect the NRC Regulatory Oversight Process Indicator for unplanned scrams per 7000 hours of critical operation.

IV. CORRECTIVE ACTIONS:

A. ACTION TAKEN TO RETURN AFFECTED SYSTEMS TO PRE-EVENT NORMAL STATUS:

The load limit amplifier card was replaced.

B. ACTION TAKEN OR PLANNED TO PREVENT RECURRENCE:

To prevent recurrence, replacement of the current obsolete and single point vulnerable NMP2 Turbine EHC system with a fault tolerant Digital EHC system is scheduled for the next refueling outage.

To further protect against latent failures, a temporary modification to lift the leads on the stop valve load limit switches was implemented. Lifting the leads minimizes the risk of fast closure of the control valves in the event of a stuck load limit switch during future turbine valve testing. Additionally, to minimize risk prior to replacement of the system, the testing method for TSVs is being revised prior to the next performance.

1. FACILITY NAME	2. DOCKET NUMBER	3. LER NUMBER		
		YEAR	SEQUENTIAL NUMBER	REV NO.
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NARRATIVE

V. ADDITIONAL INFORMATION:

A. FAILED COMPONENTS:

The definitive root cause of the equipment failure was not located but was bound to spurious actuation of load limit relays KL186 and KL187. The spurious action was caused by an intermittent ground and/or an induced voltage within the load limit circuit. The load limit amplifier card was replaced, but troubleshooting determined it was not the single cause of the event. Potentially stuck limit switches have been disabled.

B. PREVIOUS LERs ON SIMILAR EVENTS:

None

C. THE ENERGY INDUSTRY IDENTIFICATION SYSTEM (EIIS) COMPONENT FUNCTION IDENTIFIER AND SYSTEM NAME OF EACH COMPONENT OR SYSTEM REFERRED TO IN THIS LER:

COMPONENT	IEEE 803 FUNCTION IDENTIFIER	IEEE 805 SYSTEM IDENTIFICATION
Electro Hydraulic Control System	N/A	TG
Load Limit Amplifier Card	CBD	TG
Load Limit Relay	RLY	TG
Limit Switch	33	SB
Turbine Stop Valve	ISV	SB
Turbine Control Valve	ISV	SB
Turbine Bypass Valve	PCV	SB
Main Turbine	TRB	TA
Reactor Protection System	N/A	SC

D. SPECIAL COMMENTS:

None